DOCUMENT RESUME

ED 283 290 EA 019 516

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TITLE On Neglect of the Independent Variable in Program Evaluation. Project MITT Occasional Paper.

INSTITUTION Oregon Univ., Eugene. Center for Educational Policy and Management.

SPONS AGENCY National Inst. of Education (DHEW), Washington, D.C.
PUB DATE Feb 74
NOTE 9p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Concurrent Validity; *Differentiated Staffs; Elementary Education; Instructional Innovation; *Measurement Techniques; Organizational Theories; Predictive Validity; *Predictor Variables; *Program Evaluation; Program Implementation; Research and Development Centers; *Research Methodology; Research Needs; *School Organization

ABSTRACT

This paper illustrates the need for full description and measurement of differences between "experimental" and "control" situations in school program evaluation studies. Two studies were completed at the University of Oregon involving the innovative program--differentiated staffing (DS). The first study, a doctoral investigation, sought to assess the relative effects of DS on elementary students' achievement using two schools and restricted to fifth and sixth graders to which the Comprehensive Test of Basic Skills was administered twice. Neglecting the independent variable resulted in mixed findings--achievement scores did not consistently favor either school. In the second study, using the same schools, a research group at the Center for the Advanced Study of Educational Administration (CASEA), measuring staff role behavior and relationships, discovered that staff behavior did not meet program goals. Neither study could attribute student outcomes to an independent variable described as "differentiated staffing" versus "traditional" organization. Four program levels assist evaluation: (1) institutional commitment; (2) structural context; (3) role performance (staff perspective); and (4) student learning activities. Although schools' commitment and structure differed, investigations focused on level 3, program consequences that were unattained and prevented the school from description as a "differentiated staffing school." Investigators therefore evaluated a non-event. These studies demonstrate the futility of comparing student outcome measures between classrooms or schools that differ only at functionally remote levels of program description. Changes at level 3 (and preferably level 4) should document achievement data. Analytical language and measurement techniques are needed to describe the independent variable at all levels. (CJH)

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FEB 1974

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On Neglect of the Independent Variable in Program Evaluation*

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JOHN E. JONES

*An abridged version of this article appeared in the November 1973 issue of **Educational Researcher** under the title, "On the Risk of Appraising Non-Events in Program Evaluation."

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A common practice in evaluating experimental programs in education is to rest the innovation's case on comparisons of student outcome data, using results of standardized achievement tests or specially designed measures of cognitive or affective attributes. Concern with such outcome measures is eminently reasonable, of course, since it addresses what is probably the most important question asked by educators and laymen about any new program: "Does it really make an appreciable difference for students?"

Pressed to answer this kind of question, evaluators expend considerable resources in developing appropriate outcome measures and in planning and executing elaborate research designs. Well-planned evaluation studies involve collecting outcome data in "experimental" schools or classes where the program has been introduced and in "control" situations, carefully matched with "experimentals," to rule out the effects of critical extraneous factors. Comparisons may extend to variations in the type of innovative program at stake. More advanced designs entail collecting the outcome data on a before-after basis so that gains in student achievement can be compared.

What is **not** standard practice in evaluation studies is to describe fully, let alone to measure, how the programs in "experimental" and "control" situations actually differ from one another—or even to certify that they do. As educational researchers well know, characterization of the independent variable is a major bug-a-boo of program evaluation. Except in tightly controlled studies conducted in laboratory-like settings, experimental programs rarely "hold still" for the evaluator; they are subject to modification, refinement, and re-interpretation as they are put into practice in the field. Beyond this, however, evaluators encounter difficulty in describing **in principle** the essential dimensions according to which a proposed program differs from a conventional one. Neither the analytical language nor measurement techniques are available.

A serious consequence of slighting the independent variable is that elaborately designed evaluation studies may sometimes end up appraising non-events, with no one the wiser. There are certainly circumstances in which differences between what researchers regard as "experimental" and "control" programs are more fictional than factual, but in the absence of a measurement technology or tradition, such circumstances may well go undetected. Then the researchers' findings of no consistent differences in student outcomes between "experimental" and "control" programs can fundamentally mislead educators regarding the substantive worth of innovations.

These observations are far from original with us, but the apposition of two studies recently completed at the University of Oregon so aptly illustrates the point that we feel impelled to report them. The innovative program in question was differentiated staffing (DS, for short), and the first study to be described was a doctoral investigation seeking, in the candidates' words, "to assess the

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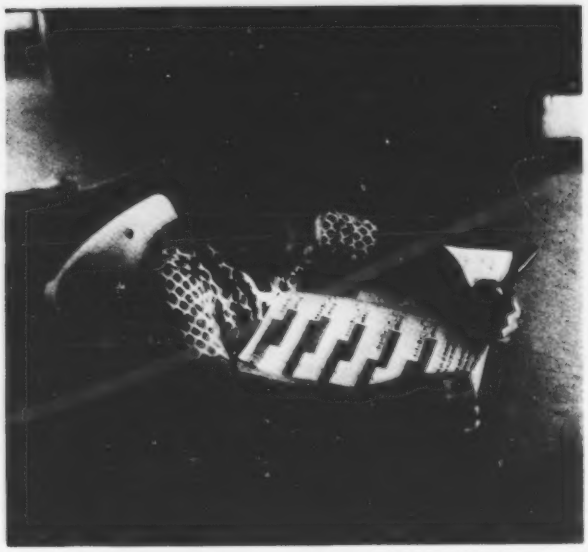

relative effects of differentiated staffing on elementary students' achievement."

Student Outcomes of "Differentiated Staffing"

The doctoral investigation had a commendable objective, given the wide popularity differentiated staffing has attained in the last several years. The candidate chose for his evaluative study an elementary school (we will call it Efstutt School) in which a DS program was to be installed in the 1970-71 school year and another school across town in the same district (Gordon School) that was not implicated in the district's federally funded DS Project. Restricting the study to fifth- and sixth-graders, his plan was to administer the Comprehensive Test of Basic Skills in the early fall in both schools and again, using the parallel form of the test, in the late spring of the school year. He obtained information indicating that the fifth- and sixth-grade pupils were closely similar in the two schools with respect to IQ and socioeconomic status—two factors that might otherwise account for differences in achievement scores.

The investigator described in some detail the DS plan that was to be introduced in Efstutt School that fall, drawing for his descriptions on the proposal the Efstutt faculty had developed in the preceding spring. Briefly, his description was this. Efstutt's 13 classroom teachers were organized into three Instructional Teams to conduct the teaching program for the first- and second-graders, the third- and fourth-graders, and the fifth- and sixth-graders. One teacher on each team was appointed team leader and paid an additional salary. Cross-cutting this arrangement were Curriculum Teams responsible for curriculum development in each of four teaching areas, again with appointed leaders. A high-level professional position was established in the school—that of Instructional Coordinator—whose occupant was to function in a supportive role to the teachers and teams. One teacher on each of the Instructional Teams was designated an Associated Instructor, thereby distinguishing him from the more senior teachers, or Instructors. Additionally, 12 noncertificated personnel were hired in Efstutt to serve as Teacher Assistants, and the Instructional teams had the service of part-time clerical aides. There were several other features of the DS plan, including job descriptions for the various positions that had been drawn up by the Efstutt faculty, but those we have reported represent the main ones.

Insofar as Gordon, the comparison school, was concerned, the investigator merely pointed out that it was staffed according to the "traditional elementary instructional model."

The findings for student achievement in the "experimental" and "control" schools at the end of the year? They were mixed: achievement score gains did not consistently favor either Efstutt or Gordon. There were no differences between the schools on the reading test of the Comprehensive Test of Basic Skills. On the language section, Efstutt's fifth-graders showed greater gains than Gordon's, but Gordon's sixth-graders gained more than Efstutt's. On arithmetic, there were no school differences at the fifth-grade level, but Gordon's sixth-graders outgained Efstutt's.

Thus, a reader of the study would be tempted to draw the conclusion that, in this instance, at least, differentiated staffing failed to produce consistently and appreciably greater achievement outcomes than the traditional staffing pattern. Certainly, the two schools did not differ strongly on the dependent variable, but did they differ on the independent variable? Precisely what was the contrast at stake? The investigator, of course, intended the contrast to be between "differentiated" and "traditional" staffing, and the study's published conclusions are phrased in these terms, but a close reading of the dissertation reveals that no procedures were used to certify that the staff organization **operated** differently in the two schools.[1] The independent variable was neither described nor measured in regard to its actual manifestation.

That inattention to the independent variable can lead to mistaken inference is the point we now want to document.

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[1] At the end of the dissertation, the candidate reported some informal observations regarding the "attitudes" of teachers toward the DS Project which would alert a careful reader to the possibility that differentiated staffing was not operational in Efstutt during the 1970-71 year. The study's findings, however, are unlikely to enter the archives of research on educational practice except through the summary in **Dissertation Abstracts**, where the comparison is flatly described as between "a differentiated staffing school" and a "nondifferentiated staffing school."

Staff Organization—Behaviorally Described

The second study we will report was initiated and conducted independently of the doctoral investigation but, as chance would have it, in the same location. Efstutt had been one of four schools that researchers at the Center for the Advanced Study of Educational Administration (CASEA) had chosen during the summer of 1970 for in-depth investigations into the problems of implementing major organizational innovations. One researcher, the second author of this paper, virtually lived in Efstutt during the 1970-71 school year making detailed observations and records of the course of the DS implementation.

Simultaneously, another group of CASEA researchers was developing instruments for use in more extensive studies. The purpose of these instruments was to measure role behavior and relationships of school staffs. By asking teachers to describe what they do on the job, with whom they talk and collaborate in their work, what realms of discretion they do and do not have, and so on, it would be possible to measure the work operations of the school along a number of dimensions of organizational analysis. Differentiated staffing is supposed to replace the essentially autonomous work operations of teachers in conventional elementary schools with articulated work groups, differentiated by skill and responsibility, serving as the basic units for carrying out the instructional program. Organizational dimensions regarded by the researchers as particularly relevant included the division of instructional labor, degree of specialization, extent of task interdependencies and work-oriented interaction, and the locus of instructional decisions, to name a few. Thus, the measures could be used to determine whether or not a staff was organized, behaviorally speaking, in accordance with key features of the differentiated staffing model.

The main instrument was field tested in three of the case-study schools, including Efstutt, in the late spring of 1971—toward the end of the first year of implementation efforts. Efstutt's case investigator, who, of course, had learned about the doctoral study, seized on an opportunity and arranged for the CASEA questionnaire to be administered to teachers in Gordon School as well.

Details of the Efstutt case study have been published elsewhere, as have the instrument data comparing Efstutt and Gordon Schools, but their combined findings can be quickly reviewed.[2]

While Efstutt teachers had been assigned to cross-graded Instructional Teams for joint instruction, for all intent and purposes, the educational program continued to be carried out in self-contained classrooms. Each classroom teacher continued to teach all subjects to the same students (except physical education) just as in Gordon School, and although Efstutt teachers at certain grade levels occasionally attempted cross-classroom grouping of students, their efforts did not last. Indeed, by the end of the year, there were more instances of close teacher collaboration in Gordon than in Efstutt.

As for Efstutt's Curriculum Teams, they were virtually inoperative. They met twice during the year for the purpose of selecting teaching materials and ordering supplies.

The position of Instructional Coordinator was filled by a well-qualified, experienced person from outside the school system, but the position turned out to be an awkward one, and the incumbent did not function entirely as expected. She was shunted by the principal into peripheral activities associated mainly with training the contingent of paraprofessionals, and she had difficulty in working out a meaningful role with the teachers, who were reluctant to accept her on a collegial basis. In the end, she came to serve in a role much like that of a vice-principal.

The distinction between Instructor and Associate Instructor was totally inoperative in Efstutt. While the job descriptions had indicated a limited and subordinate role for the Associate Instructors, in practice the tasks they performed were indistinguishable from those of any other teacher. They were on the same salary schedule as all other teachers in the district. Staff members themselves were never heard to use the term "associate instructor" throughout the entire year, and on one occasion, when the case investigator asked the principal to identify the associate instructors, he had to check his records to recall whom he had designated.

Profiles of task performance of teachers in Efstutt and Gordon were nearly identical, with only a few im-

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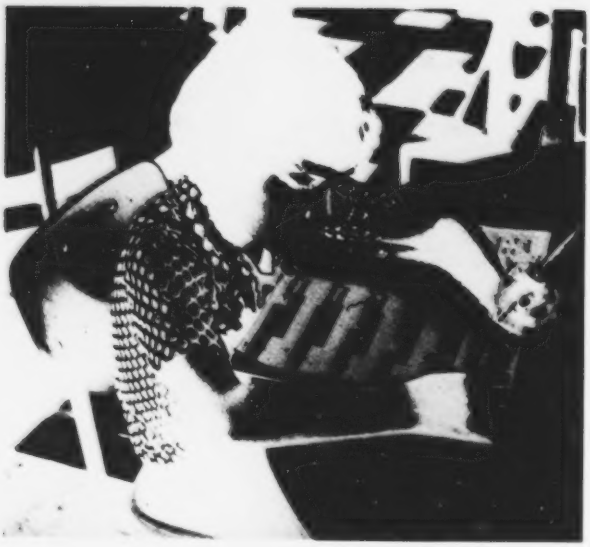
[2]John E. Jones, A Case Study of a Selected Elementary School Under Conditions of Planned Change. Unpublished doctoral dissertation, Syracuse University, 1973; W. W. Charters, Jr., **Measuring the Implementation of Differentiated Staffing: A Comparison of Two Elementary Schools**, Monograph No. 26, Center for the Advanced Study of Educational Administration, 1973.



portant differences out of 67 items. There was no evidence of the emergence of specializations among Efstutt teachers, but they spent less time than the Gordon staff on clerical chores, due to the presence of clerical aids. At the same time, they devoted less time and effort to a series of tasks indicative of the individualization of instruction than was true among teachers in the so-called "conventional" school (like working with small groups, doing diagnostic work on learning problems, or holding remedial sessions). And at the end of the school year, Efstutt teachers were inordinately involved in pupil management tasks as a result of their large classes.

The presence of paraprofessionals created the most pronounced differences in staff organization, behaviorally speaking, between Efstutt and Gordon Schools. The differences were not always as expected. Teacher assistants were apportioned to classroom teachers on a one-to-one basis rather than to the instructional teams as such. The close relationship of the teacher and his classroom assistant brought an entirely new dimension into the Efstutt organization. The total volume of interpersonal communication increased dramatically as a result of the new dyads, and it was communication in which teachers (for once) talked to another adult about the intimate details of their classroom work.

Thanks to the DS plan, though, Efstutt's classes were unusually large for the district—averaging about 37 pupils in contrast to Gordon's 24—and the Efstutt faculty relied heavily on their assistants to carry the added burden. This did not work for several reasons. For one thing, the assistants were inexperienced in managing pupils and were unable to invoke the authority of a teacher. For another thing, the assistants were on a shortened daily schedule and did not arrive early enough to participate in planning the day's activities or work out their responsibilities with the teachers. (This was changed later in the school year.) In consequence, the presence of the teacher assistants failed to relieve teachers of the extra burden of large classes and, in fact, exacerbated the problems of instruction and of pupil control.

In sum, the CASEA case-study information makes it clear that in many respects the Efstutt staff was not behaving as a "differentiated staff" by late spring of 1971, and the comparative measures taken at the same time indicated that on several key dimensions Efstutt's educational program was operationally organized in a fashion almost identical to Gordon's. That differences existed between the two schools, there can be no doubt. There were three dominating concerns among the Efstutt teaching faculty during the year that, insofar as our data can tell us, distinguish it from the Gordon faculty: how to cope with teaching over-sized classes, how to establish viable work relations with teaching assistants, and, above all, how to regain the control the teachers felt they had lost over pupils in their classrooms. All three can be traced to Efstutt's participation in the DS Project. These differences, however, can hardly be conceived as defining a "differentiated staffing" versus "traditional" staff organization, and they are certainly not conditions from which one would predict appreciably greater gains in achievement for the Efstutt case.

These are the reasons, then, that it would be wrong to attribute differences in student outcome measures, or lack of such differences, to an independent variable described as "differentiated staffing" versus "traditional" organization. The dissertation study that was designed to assess the effects of differentiated staffing turned out to be appraising a non-event.

Levels of Reality in Program Description

Are we too hasty, though, in saying that Efstutt was not a differentiated staffing school? After all, a cadre of teaching assistants had been employed, the position of instructional coordinator had been created and filled, instructional and curriculum teams were formed and their leaders appointed, and so on. Formally speaking, there were 16 faculty and staff categories listed for Efstutt School—twice as many as for Gordon. Even though staff members did not perform roles precisely as anticipated by the vision of differentiated staffing, Efstutt unequivocally was a different school from Gordon in a number of important respects, and it was different from what it had been the previous year. These differences can certainly be laid to Efstutt's participation in the Differentiated Staffing Project of the district, so in what sense was Efstutt **not** a differentially staffed school?

Our studies of the innovation process at CASEA have required us to grapple with the definitional problem time and again. At what point can one say, for example, that an innovation has been adopted? How does the investigator establish that a so-called new program is generically different from the one it replaced, other than the name by which it is called? In general, how is change in a school's educational program to be conceived and measured?

As a first step, we have found it useful to distinguish four levels of reality of a school's program. We refer to them as "levels" because they are ordered according to their proximity to the attributes of students which they are designed to affect—learning outcomes. In our listing, below, they run from the most remote, in terms of functional relationships with the covert psychological processes of learning, to the most proximal. We consider them levels of "reality" because, from an organizational point of view, they each carry distinct, observable social consequences, by deliberate intent and in fact.

It is most natural for us to discuss the levels from the standpoint of program **change**, but this should not obscure the fact that the discussion applies equally well to program differences, such as in the comparison of two schools. We are, after all, concerned with the independent variable(s) of program evaluation, and by **variable** we mean some identified property of an object that can take on different values, whether from one time to another or from one instance to another. It is not our present purpose, however, to suggest variables but only the levels at which they might be sought.

Level 1. Institutional commitment. A public announcement that a school intends to introduce such-and-such an educational program is an event of significance, especially as it emanates from an authoritative source and embodies a more or less binding commitment on organization members. It is intended to have consequences, and it does. An authoritative commitment is designed to set directions and goals for staff members, to legitimize the reallocation of resources, to elicit enthusiasm and support, and so on, and it often has other effects as well, such as arousing vocal opposition to the plan in various sectors of the community or school. If the commitment is binding, as may be the case of a contract with a funding agency, school personnel may find themselves under close scrutiny and may be called to account for their failure to deliver at some later date. In any event, an institutional commitment alters the field of forces governing the actions of organizational participants in and out of the school and introduces new conditions with which they must contend.

One level of program description, then, is found in authoritative pronouncements, statements of intention, promises. It corresponds to Smith and Keith's concept of the school's **formal doctrine** and is analyzable according to the dimensions they suggest.[3] Few evaluators, of course, would be content to end their specification of the independent variable at this level.

Level 2. Structural Context. "Structural" alterations refer to those changes in formal arrangements and physical conditions that form the context within which staff members carry out an educational program. They are usually of the sort that can be effectuated by managerial directives or acts and include such things as employing people, establishing pay rates, changing job titles, forming and appointing committees, assigning responsibilities, purchasing instructional materials, making equipment available, knocking out classroom walls, scheduling classes, and so on. Level 2 changes usually can be easily documented. While structural supports are minimal for some types of programmatic innovation, extensive contextual alterations are essential for other types. Differentiated staffing is a case in point. Structural alterations can be seen as varying in the compellingness of their impact on staff behavior. A school faculty may readily ignore changes in job descriptions or titles, but the daily presence of a paraprofessional in a teacher's classroom has inescapable consequences for the teachers, whether as intended or otherwise.

While structural features are easily observed, the investigator's problem lies in having at hand few generic dimensions according to which the features can be ordered. Currently, our language for program description consists largely of ill-defined nominal categories, or trade names, designed to promote and sell rather than to classify and analyze.

Level 3. Role performance (staff perspective). In denoting the third level of program description, we come close to what Gross and his colleagues meant in their discussion of the "degree of actual implementation" of organizational innovations.[4] In their view, the behavior

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[3]Besides proposing a number of dimensions of variation in formal doctrines, these authors postulate various organizational consequences that can be expected from them. See Louis M. Smith and Pat M. Keith, **Anatomy of Educational Innovation**, Wiley, 1971, Chap. 2.

[4]Gross, Neal, Giacquinta, Joseph B., and Bernstein, Marilyn, **Implementing Organizational Innovations: A Sociological Analysis of Planned Educational Change**. New York: Basic Books, 1971.

patterns of teachers must be observed to change, and change so as to accord with the role performance required by the innovation, before it can be said that an innovation is actually implemented. It is the teacher's **use** of new instructional packages, for instance, that constitutes an innovation, not the mere presence of the packages in the classroom. It goes almost without saying that behavioral changes of teachers do not automatically follow from the structural alterations and institutional commitments that are designed to produce them; less apparent, though, is the possibility that structural changes may induce behavioral adaptations on the part of staff members that are contrary to intentions. The behavioral consequences that ensued from the presence of teacher assistants in Efstutt's classrooms is a case in point.

Again, the evaluator is hampered by the absence of an analytical language suited to describing a school's work system in behavioral terms, and the observational problem is more severe than in structural description. Measurement entails relational as well as individual-performance aspects or roles, such as patterns of task interdependence, which cannot be discerned from one teacher's behavior alone.

Level 4. Learning activities (student perspective). The manifest purpose of the teacher's role performance is to produce learning in students, but this cannot happen directly. The best the teacher can do is to induce students to engage in activities deemed instrumental to the covert psychological processes he hopes to affect. It is the student's own activities and experiences that are most immediately related to learning outcomes, albeit the teacher has an important hand in arranging them so that the link is made. Yet, the most skillfully executed science demonstration will teach nothing to the boy who is in the lavatory marking on the walls. Opportunities for slippage are enormous between the teacher's performance as an instructional agent and the student's performance of the activities that are supposed to be instrumental to learning, quite apart from the general uncertainties as to what activities **are** instrumental, and it is of no small importance for program evaluators to attempt to describe or measure the school's educational program as experienced and enacted by students.

Given the many contingencies and contravening circumstances between what a student does in school and what he learns from what he does, the evaluator (or school man) might consider himself fortunate if he found anything other than "no significant differences" between program variations at even this most intimate level. In fact, we are inclined to the view that the local school's responsibility for a child's education ends at Level 4—at the point where the student is found to be engaging in, and engaged by, sequences of instructional events which, according to the best contemporary knowledge of pedagogy available to the school, have a reasonably high probability of producing the desired learning outcomes. To hold a school system accountable for the measured outcomes, themselves, seems to be an unwarranted shift to one institution of the responsibility that more properly rests in the pedagogical sciences and the R & D community. In this view, carefully devised measures of variables at Level 4 would replace achievement test scores as the criterion variable in program evaluation. If the view be regarded as extreme, at least such measures should be developed and used as **intermediate criteria** of program impact, giving the educational innovator something more tangible, or less tenuous, than changes in achievement scores by which to gauge his progress.

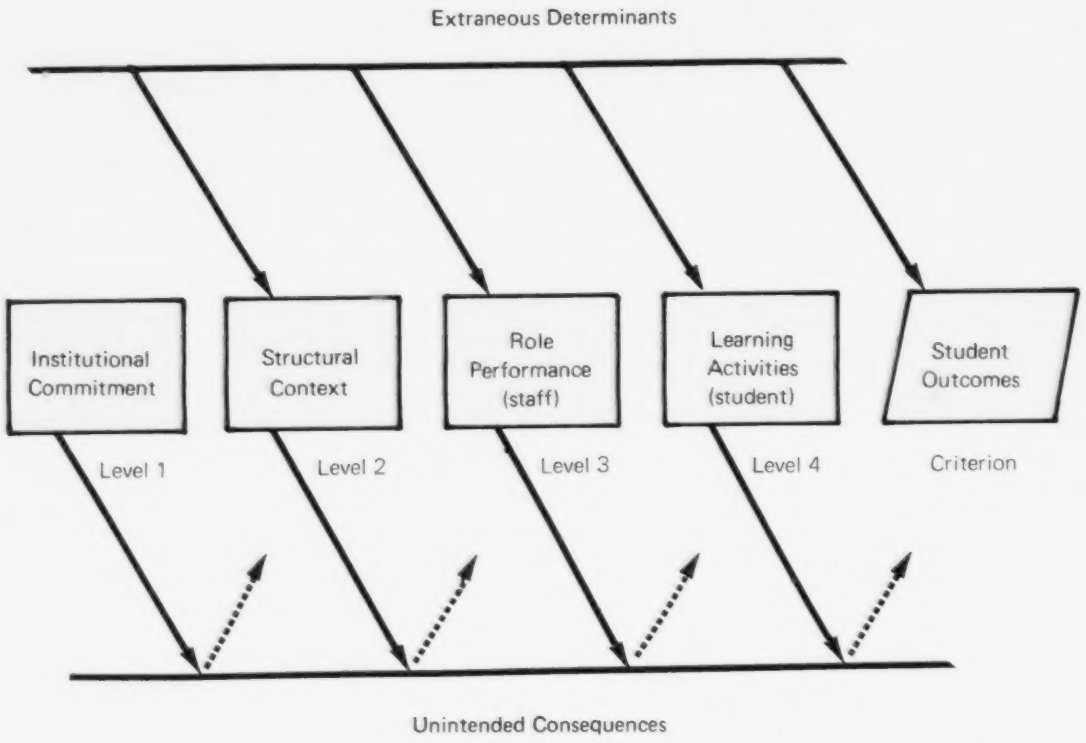
Figure 1 depicts the four levels of program description we have discussed. It makes apparent the torturous path between an announced intention to change an educational program and demonstrable changes in students' psychological capacities. Not only is a time lag implied but each section of the path is endowed with equivocality. For one thing, the state of the educational program at each of the levels is the product of many forces, only a fraction of which are subject to intentional manipulation and rational planning. This is increasingly true as we move from Level 1 to Level 4 in the diagram. Just as school experiences determine a small part of what children know, so the structures created by the educational innovator only partially determine how the instructional staff behaves, and the staff, in turn, governs only some of what the child experiences in school.

For another thing, plans have a habit of going awry. When one sets out to alter the state of the educational program at one level with the intention of affecting the program at the next level in as complex a social system as the school, he can count on producing side-effects and unintended consequences, and sometimes these work in opposition to the very effects he sought to bring about. We have alluded to a few of these in our discussion of the Efstutt case, and others could be cited. In the high school studied by CASEA investigators, for example, the human relations training given the staff to promote "openness" and readiness for change apparently crystallized among them a norm of equalitarianism that was in distinct conflict with the hierarchical features of the differentiated staffing plan.[5] In any event, each of the linkages in the chain of Figure 1 is problematic.

Our examination of the levels of program description helps put in perspective the question of whether or not Efstutt can be called a "differentiated staffing school." The answer depends on the level at which one chooses to describe the school. The doctoral investigator characterized Efstutt's program principally on the basis of documents accompanying the **institutional commitment** to differentiated staffing (Level 1), although taking account

[5]C.T. Wacaster, The Life and Death of Differentiated Staffing in Columbia High School: Discontinuance of an Innovation, Unpublished doctoral dissertation, University of Oregon, 1973.

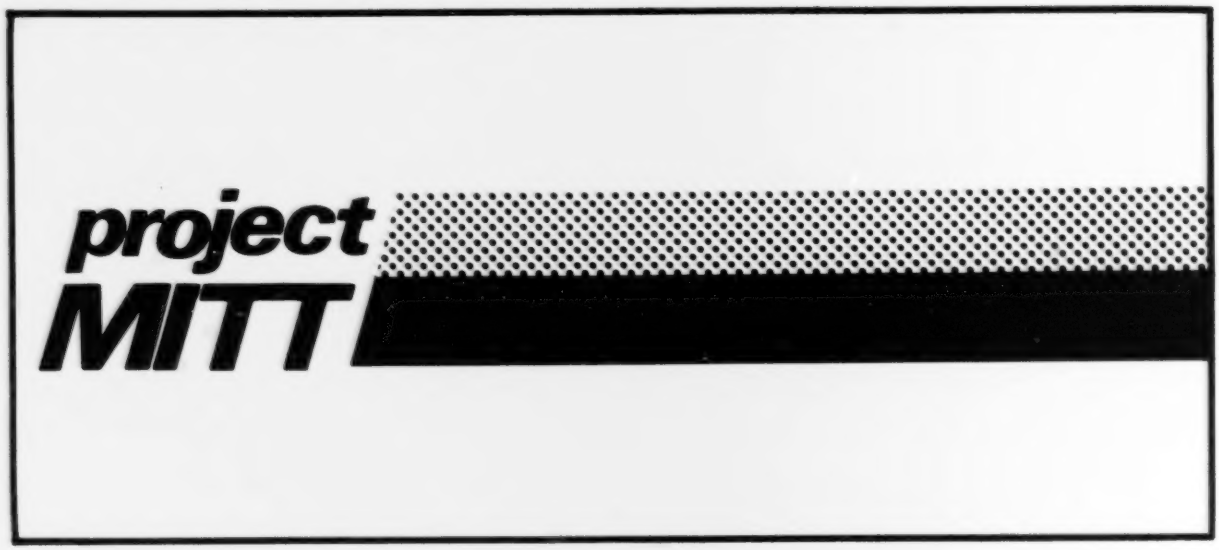
Figure 1. Levels of Program Description



of the fact that the proposed alterations in **structural context** were, indeed, introduced (Level 2), while our measures and case-study data focused on the **role performance** of the staff (Level 3). There is no question but that Efstutt and Gordon schools differed in commitment and structure during the 1970-71 school year, but the change in Efstutt gave rise to few of the behavioral consequences that were expected. Most of the Level 3 consequences were unattained or unintended, and some of the latter were counter-productive. Only with a Level 3 description in mind, then, is it fair to say that Efstutt was not a "differentiated staffing school" or that the investigator evaluated a **non-event.**

Our analysis points up the essential futility of testifying to the worth of educational programs by comparing student outcome measures between classrooms, or schools, that differ only at the most functionally remote levels of program description. Not only is it futile but it is seriously misleading to the field of professional education. Inherently valid educational ideas can all too readily be "proven" worthless by impressively designed statistical studies that, nevertheless, are remiss in certifying that program variation in fact occurred at a suitably proximal level of description. In our view, it is an abrogation of professional responsibility for program evaluators to collect achievement test data, as easy as they may be to come by, without simultaneously going to extraordinary lengths to document the program differences or changes at least at Level 3 and preferably at Level 4 of program description. Obviously, for evaluators to meet this responsibility, it is incumbent on the R & D community to develop the analytical language, the variables, and the techniques of measurement for establishing the state of the independent variable at one or another of these levels.

In closing, we would remark that each of the linkages shown in Figure 1 is worthy of detailed, extended investigation. Each is extremely complex yet essential to a



full explication of the means by which the school is to achieve its prime mission. Thus, the study of the school's organization and management, though ostensibly dealing with matters peripheral to the core issues of instruction and learning, can be seen as helping to forge links in the causal chain connecting the goals we desire and seek through our educational institutions, on the one hand, with the goals we are able to attain, on the other.

Related Center Publications

Charters, W. W., Jr., et al., **The Process of Planned Change of the School's Instructional Organization,** Monograph No. 25, Center for the Advanced Study of Educational Administration, 1973.

Charters, W. W., Jr., **Measuring the Implementation of Differentiated Staffing,** Monograph No. 26, Center for the Advanced Study of Educational Administration, 1973.

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